

### Remarks

Reconsideration and withdrawal of the rejections of the claims, in view of the remarks and amendments presented herein, is respectfully requested.

Claims 1-13 and 30-37 are amended, claim 38 is withdrawn; as a result, claims 1-13 and 30-37 are now pending in this application. A clean version of the pending claims is attached hereto as Appendix A entitled, "Clean version of pending claims" for the Examiner's convenience.

### Claim Objections

**The Examiner objected to claims 1-7, 11-12, 30-37 because the abbreviation "NDO" is not spelled out.** Applicant has amended the claims according to the Examiner's suggestion to replace "NDO" with "naphthalene dioxygenase". Accordingly, withdrawal of the objections to the claims is respectfully requested.

**The Examiner objected to claim 13 alleging that the claim is partially drawn to non-elected inventions.** Applicants respectfully submit that amendment of claim 13 to relate to a naphthalene dioxygenase related complex, wherein the alpha-subunit comprises SEQ ID No: 2 causes the claim to relate to the elected invention. Accordingly, withdrawal of the objection to the claim is respectfully requested.

**The Examiner objected to claims 9-10 and 13 because of the recitation of "has or comprises" since the term "comprises" implies "has", making the recitation of both "has or comprises" redundant.** Applicant has amended the claims to remove the phrase "has or" from the claims. Accordingly, withdrawal of the objections to the claims is respectfully requested.

### Rejections under 35 U.S.C. § 112

**The Examiner rejected claims 1-13 and 30-37 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.** More specifically, the Examiner alleges that the recitation of "NDO related complex" does not adequately describe a

family of bacterial enzymes, or members of the family. This rejection is traversed as it relates to the currently pending claims.

A patent claim is sufficiently definite to satisfy 35 U.S.C. § 112, second paragraph if one skilled in the art would understand the bounds of the claim when read in light of the specification. Exxon Research v. United States, 60 USPQ2d 1272 (Fed. Cir. 2001) (citing Miles Labs., Inc. v. Shandon, Inc., 27 USPQ2d 1123 (Fed. Cir. 1993)). If the meaning of the claim is discernable, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds. Id. (citing Modine Mfg. Co. v. U.S. Int'l Trade Comm'n, 37 USPQ2d 1609 (Fed. Cir. 1996)).

Amended claim 1 is directed to a naphthalene dioxygenase complex or naphthalene dioxygenase related complex comprising a plurality of polypeptides, wherein the complex or the related complex catalyzes oxidation of an aromatic substrate and comprises at least one alpha-subunit polypeptide that comprises: 1) a substituted amino acid at a position corresponding to position 352 in an alpha-subunit having SEQ ID NO: 26, 2) a substituted amino acid at a position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in an alpha-subunit having SEQ ID NO: 26, or 3) a substituted amino acid at the position corresponding to position 352, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in an alpha-subunit having SEQ ID NO: 26, or 4) a fragment of any of 1-4 that catalyzes oxidation of an aromatic substrate.

Applicants respectfully submit that one skilled in the art can determine whether a naphthalene dioxygenase complex or naphthalene dioxygenase related complex is within the scope of the claims based on the presence of an alpha-subunit having the indicated amino acid substitutions in SEQ ID NO: 26, or an alpha-subunit having amino acid substitutions which correspond to the indicated amino acid substitutions in SEQ ID NO: 26. As shown in Tables 2 and 6, amino acid substitutions corresponding to those in SEQ ID NO: 26 can be determined. These corresponding amino acids can be determined through use of known methods, such as sequence or structural comparison to crystal structural data (for example, see Kauppi et al., Structure, 6(5):571-586 (1998) (enclosed herewith)).

Applicants submit that, because one skilled in the art can readily determine the scope of the claims, the claims satisfy the requirements of 35 U.S.C. § 112, second paragraph.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims.

**The Examiner rejected claims 1-8, 11-12 and 30-37 under 35 U.S.C. § 112, second paragraph as being indefinite for recitation of position 352, 201, 202, 260, 316, 351, 358, 362, or 366 without indicating the specific sequence to which the recited positions are associated.** This rejection is traversed as it relates to the currently pending claims.

Applicants have amended claims 1-7 according to the Examiner's suggestion to provide SEQ ID NO: 26 as a sequence to which specific amino acid positions can be referenced. Applicants respectfully submit that one skilled in the art can determine the identity of specific amino acid positions within SEQ ID NO: 26, and corresponding amino acid positions in other alpha-subunits which correspond to SEQ ID NO: 26. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims.

**The Examiner rejected claims 1-13 and 30-37 under 35 U.S.C. § 112, second paragraph as being indefinite for recitation of a "catalytically active fragment thereof".** More specifically, the Examiner alleges that the reactions catalyzed by the fragment cannot be determined. This rejection is traversed as it relates to the currently pending claims.

Applicants have amended claims 1-7 to describe a catalytically active fragment as one that catalyzes oxidation of an aromatic substrate. Accordingly, Applicants submit that one skilled in the art can determine the scope of the claims, and respectfully request reconsideration and withdrawal of the rejections of the claims.

**The Examiner rejected claims 1-8, 11-12 and 30-37 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.** This rejection is traversed as it relates to the currently pending claims.

Claims 1-7 have been amended to include a sequence identification number to which the amino acid position of specific amino acid substitutions can be referenced. Applicants emphasize that the amino acid sequences and structures of numerous naphthalene dioxygenase

alpha-subunits which correspond to SEQ ID NO: 26 are known in the art. Examples of such naphthalene dioxygenase alpha-subunits are provided within the specification (page 17, line 3-31). Accordingly, Applicants assert that persons of skill in the art can determine a corresponding amino acid position, or positions, in a naphthalene dioxygenase alpha-subunit which corresponds to SEQ ID NO: 26. Examples of representative amino acid substitutions corresponding to F352 in SEQ ID NO: 26 are provided in Tables 2 and 6 (page 17, line 18-31; page 36, line 1-20) of the specification. In addition, claim 1 has been amended to indicate that a naphthalene dioxygenase complex or naphthalene dioxygenase related complex catalyzes oxidation of an aromatic substrate.

It is respectfully emphasized that Applicants have provided numerous examples of catalytically active dioxygenases in which a specific amino acid has been substituted in an alpha-subunit (for example, Tables 2, 3, 6, 7, and 9-11). In addition, Applicants have described methods to determine if a naphthalene dioxygenase complex or naphthalene dioxygenase related complex catalyzes oxidation of an aromatic substrate (i.e., Example 4, 6, and 7).

Applicants respectfully submit that, because the claims have been amended to include a structure and a function which can be used to determine the scope of the claims, reconsideration and withdrawal of the rejections of the claims is proper and is respectfully requested.

**The Examiner rejected claims 1-8, 11-12 and 30-37 under 35 U.S.C. § 112, first paragraph, alleging that the specification does not enable any NDO or dioxygenase with any substitution.** This rejection is traversed as it relates to the currently pending claims.

The test for enablement is whether one reasonably skilled in the art could make or use the invention from the disclosure in the patent coupled with information known in the art without undue experimentation. M.P.E.P. § 2164.01(a) (citing United States v. Teletronics, Inc., 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988)). However, the fact that experimentation may be complex does not necessarily make it undue, if the art typically engages in such experimentation. In re Certain Limited-Charge Cell Culture Microcarriers, 221 USPQ 1165, 1174 (Int'l Trade Comm'n 1983), *aff'd. sub nom.*, Massachusetts Institute of Technology v. A.B. Fortia, 774 F.2d 1104, 227 USPQ 428 (Fed. Cir. 1985).

As stated above, claims 1-7 have been amended to include a sequence identification number to which the amino acid position of specific amino acid substitutions can be referenced.

Applicants assert that persons of skill in the art can determine a corresponding amino acid position, or positions, to an amino acid in a naphthalene dioxygenase alpha-subunit having SEQ ID NO: 26. Examples of such naphthalene dioxygenase alpha-subunits are provided within the specification (page 17, line 3-31). Amino acid substitutions that correspond to F352 in SEQ ID NO: 26 are also provided in Tables 2 and 6 (page 17, line 18-31; page 36, line 1-20) of the specification. In addition, claim 1 has been amended to indicate that a naphthalene dioxygenase complex or naphthalene dioxygenase related complex that catalyzes oxidation of an aromatic substrate.

It is respectfully submitted that the currently pending claims are fully enabled because the claims have been amended to include SEQ ID NO: 26 as a reference sequence, which corresponds to Swiss Prot accession number P23094. Furthermore, the pending claims are directed to a naphthalene dioxygenase complex or naphthalene dioxygenase related complex that catalyzes oxidation of an aromatic substrate. Applicants respectfully submit that those of skill in the art can identify corresponding amino acids to the specific substitutions described for SEQ ID NO: 26 in the alpha-subunit, and determine if the naphthalene dioxygenase complex or naphthalene dioxygenase related complex containing a substituted alpha-subunit can catalyze oxidation of an aromatic substrate according to the direction provided by Applicants, and through use of methods known in the art without undue experimentation.

Accordingly, Applicants submit that reconsideration and withdrawal of the rejections of the claims is proper and is respectfully requested.

#### **Rejections under 35 U.S.C. § 102**

**The Examiner rejected claims 1-8, 11-12, and 30-37 under 35 U.S.C. § 102(b) as being anticipated by Jiang et al., J. Bacteriol., 178:3133-3139, (1996)).** This rejection is traversed as it relates to the currently pending claims. Applicants have amended the claims to include a reference amino acid sequence (SEQ ID NO: 26).

Applicants respectfully submit that the claims are not directed to any naphthalene dioxygenase, rather the claims are directed to naphthalene dioxygenases that include an alpha-subunit that has or corresponds to SEQ ID NO: 26. Applicants further submit that Jiang et al. do

not disclose a naphthalene dioxygenase alpha-subunit as recited in the claims. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims.

**The Examiner rejected claims 1-8, 11-12, and 30-37 under 35 U.S.C. § 102(b) as being anticipated by Mondello et al., Applied and Environmental Microbiology, 63:3096-3103, (1997)).** This rejection is traversed as it relates to the currently pending claims.

Applicants have amended the claims to include a reference amino acid sequence (SEQ ID NO: 26).

Applicants respectfully submit that the claims are not directed to any naphthalene dioxygenase, rather the claims are directed to naphthalene dioxygenases that include an alpha-subunit that has or corresponds to SEQ ID NO: 26. Applicants further submit that Jiang et al. do not disclose a naphthalene dioxygenase alpha-subunit as recited in the claims. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejections of the claims.

#### **Double Patenting**

**The Examiner objected to claim 13 as being partially drawn to a non-elected invention.** Applicants have amended claim 13 such that it is directed to the naphthalene dioxygenase related complex of claim 5 wherein the alpha-subunit comprises SEQ ID No: 2. Applicants submit that amended claim 13 is directed toward the elected invention, and differs from claim 10, which is directed to a naphthalene dioxygenase complex wherein the alpha-subunit comprises SEQ ID No: 2. As defined within the specification (page 10, line 30 to page 11, line 4), a naphthalene dioxygenase complex and a naphthalene dioxygenase related complex differ. Accordingly, Applicants respectfully submit that amended claim 13 is not subject to a double patenting rejection in view of claim 10.

**Conclusion**

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612-371-2123) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743

Respectfully submitted,

REBECCA PARALES ET AL.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.

P.O. Box 2938

Minneapolis, MN 55402

612-359-3265

371-2123

Date

June 20, 2003

By

Leif T. Stordal

Leif T. Stordal

Reg. No. 46,251

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, P.O.Box 1450, Alexandria, VA 22313-1450, on this 20 day of June, 2003.

**Candis B. Buending**

Name

Signature

Candis B. Buending